Machining

Manufacturing Technologies

The Manufacturing Science and Technology Center's machining group consists of two departments: Manufacturing Processing and Manufacturing Processes and Services. The two departments team to build, procure, and assemble unique prototype and production hardware with diverse quality requirements. Sandia's in-house capability can manufacture hardware ranging from microscopic to proportions measured in feet and tons. The group's outside contacts and resources are almost boundless. This team's expertise includes: precision machining, welding, fabrication and assembly, aircraft quality sheet metal construction and explosives machining and assembly. The department can manage a variety of activities: design modifications, in-house fabrication, outside shop selection and surveillance and manufacturing records management.

Staff can work with your engineers to transform sketches and ideas into working prototypes. With more than 40 consecutive years of experience in prototype development and project management, there is a commitment to provide a level of quality, rigor and documentation that is tailored to your requirements.

Capabilities

- Project Machining—Manufacturing services and project management to produce R&D hardware, test fixtures, and laboratory equipment. Machinery includes live spindle tooling lathes, CNC lathes, CNC milling machines, wire-cut EDMs, a high-speed machining center and a CNC four-axis EDM sinker. Customer provided solid models are used to manufacture hardware, or the solid models can be produced from sketches and blueprints.

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company,for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

National Nuclear Security Administration

Sandia National Laboratories

- Miniature Machining - Start-to-finish fabrication of very complex (.0002 tolerance) miniature devices. This team uses CNC milling machines, jewelers and CNC lathes, ram and wire EDMs, and jig bores.

- Explosives Processing - The explosives complex personnel have knowledge in machining, pressing powders, tool and die design, disassembly, assembly, storage, handling and transportation of explosives. They machine raw explosives into a variety of shapes and perform complex assembly and disassembly of explosive devices. The fabrication equipment is modified for explosives' safety and adapted for remote operation.
- Heavy Machining - Large CNC machines are used to fabricate prototype hardware that weighs up to 50,000 pounds and is 84 inches long. Assembly performed upon customer request. Manufacturing project management is available.
- Rapid Turnaround Group (RTA) - The RTA machine shop provides manufacturing services and project management. The tradesmen and trainees produce R&D hardware, test fixtures and laboratory equipment. The group can assist with your production needs and routinely produces QC-1 hardware and the associated documentation. Your need is our schedule. CNC milling machines, a large jig bore, CNC lathes, conventional lathes and milling machines are used to meet your timetable.
- Composites Group - Machine composite materials: including carbon, silica phenolic, fiberglass and ceramic.
- Abrasives Group - Lap and polish to micro-inch finishes and flatness and precision-grind exotic materials such as quartz, sapphire, boron nitride, and tungsten. Equipment includes: surface grinders, outside diameter and inside diameter grinders, universal grinders and honing machines, CNC jig grinders (for grinding complex configurations in a wide variety of materials), lapping and polishing machines, and verification inspection equipment.

A partial list of machining and finishing equipment

• Computer Numerical Controlled (CNC) three-, four-, and five-axis machining centers	• CNC Four-axis EDM – will accommodate parts up to 8" x 17" x 8"
• Surface Grinders – Capacity from 6" x 8" to 36" x 96"	• ID & OD grinders (Capacity: 0.05" to 30" diameter)
• Conventional lathes and milling machines	• On-Machine Acceptance (OMA)
• High-speed machining	• Small jig bores
• Jeweler's lathes	• Lapping and polishing machines
• CNC milling machines	• Verification equipment
• Live Spindle Tooling Lathes	• Honing Machines
• Large jig bore	• CNC jig grinders
• 42-inch CNC horizontal lathe	• Micro Machining EDM
• 84-inch CNC vertical boring mill	• CNC wire-cut EDMs
• CNC lathes	• Five-axis mill/turn center

Resources

The group can machine engineered hardware from miniature (microscopic) to 84 inches in diameter and weighing 25 tons. The machine tools range from five-axis machining centers and lathes with live spindle tooling to the basic conventional lathes, milling machines, saws and hand tools. The craftsmen and supervisors are available for direct interface with customers.

Accomplishments

- Developed and implemented procedures for the disassembly of explosive devices from radioactive weapon components.
- Manufactured a custom-designed, 18,000 pound, electrically operated centrifuge.
- Designed and built linear shaped charge bending fixtures for unique munitions disposal.
- Machined production lots of weapon components that had an internal spiral. All dimensions were machined to a tolerance of ± .0005.

- Fabricated eleven B61 trainers for the military (QC-1).
- Assisted in the design, and then manufactured six sets of fins and tail sections. The assembly included machined and precision formed hardware, cork coating, and a stainless steel leading edge for the fins.

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SAND2003-3889P